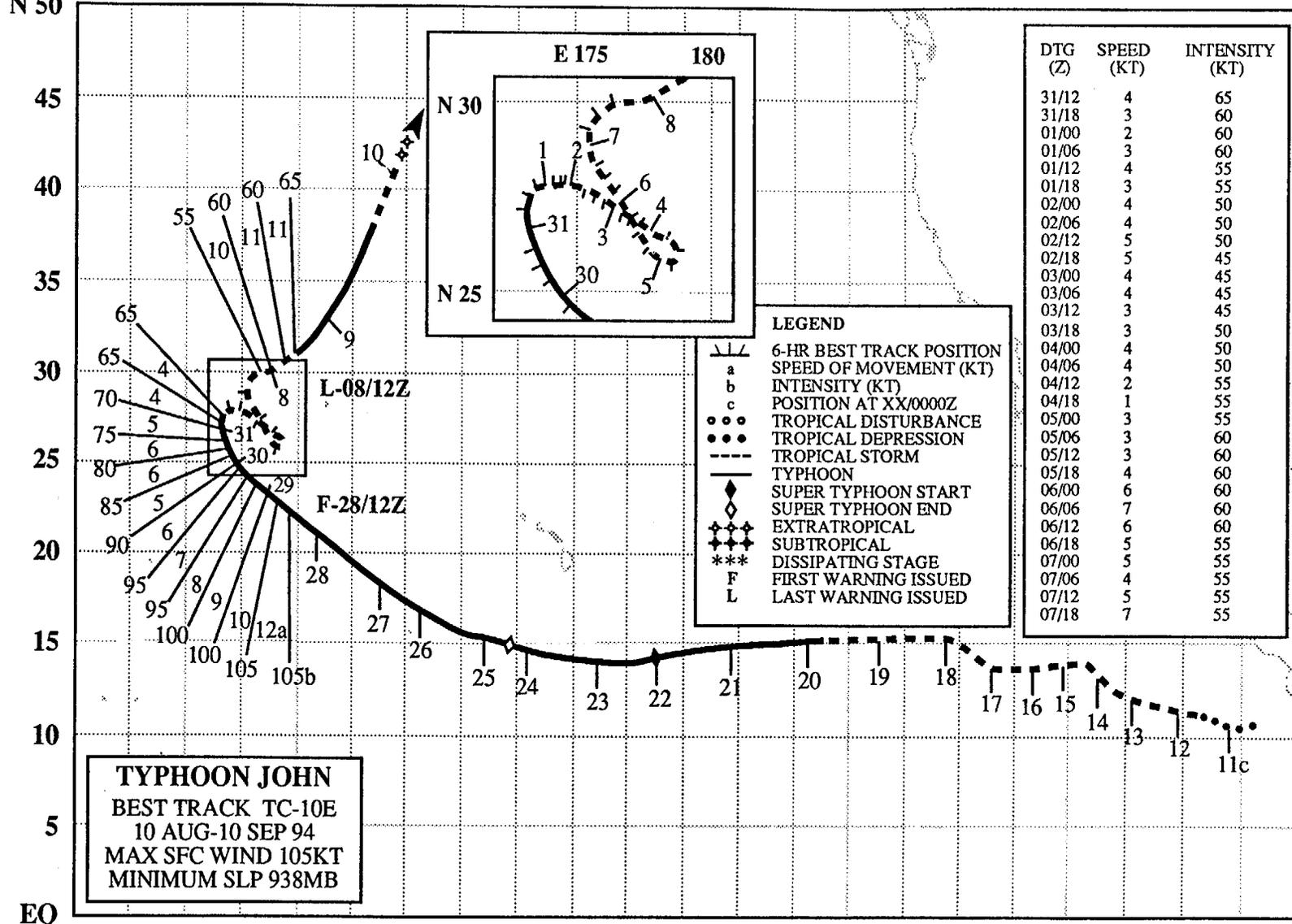


E 160 170 180 170 160 150 140 130 120 110 100 90 W



DTG (Z)	SPEED (KT)	INTENSITY (KT)
31/12	4	65
31/18	3	60
01/00	2	60
01/06	3	60
01/12	4	55
01/18	3	55
02/00	4	50
02/06	4	50
02/12	5	50
02/18	5	45
03/00	4	45
03/06	4	45
03/12	3	45
03/18	3	50
04/00	4	50
04/06	4	50
04/12	2	55
04/18	1	55
05/00	3	55
05/06	3	60
05/12	3	60
05/18	4	60
06/00	6	60
06/06	7	60
06/12	6	60
06/18	5	55
07/00	5	55
07/06	4	55
07/12	5	55
07/18	7	55

**LEGEND**

- △/△ 6-HR BEST TRACK POSITION
- a SPEED OF MOVEMENT (KT)
- b INTENSITY (KT)
- c POSITION AT XX/0000Z
- ○ ○ ○ TROPICAL DISTURBANCE
- ● ● ● TROPICAL DEPRESSION
- TROPICAL STORM
- TYPHOON
- ◆ SUPER TYPHOON START
- ◇ SUPER TYPHOON END
- ◆ ◆ ◆ ◆ EXTRATROPICAL
- ◆ ◆ ◆ ◆ SUBTROPICAL
- \*\*\* DISSIPATING STAGE
- F FIRST WARNING ISSUED
- L LAST WARNING ISSUED

**TYPHOON JOHN**  
 BEST TRACK TC-10E  
 10 AUG-10 SEP 94  
 MAX SFC WIND 105KT  
 MINIMUM SLP 938MB

128

EQ

## TYPHOON JOHN (10E)

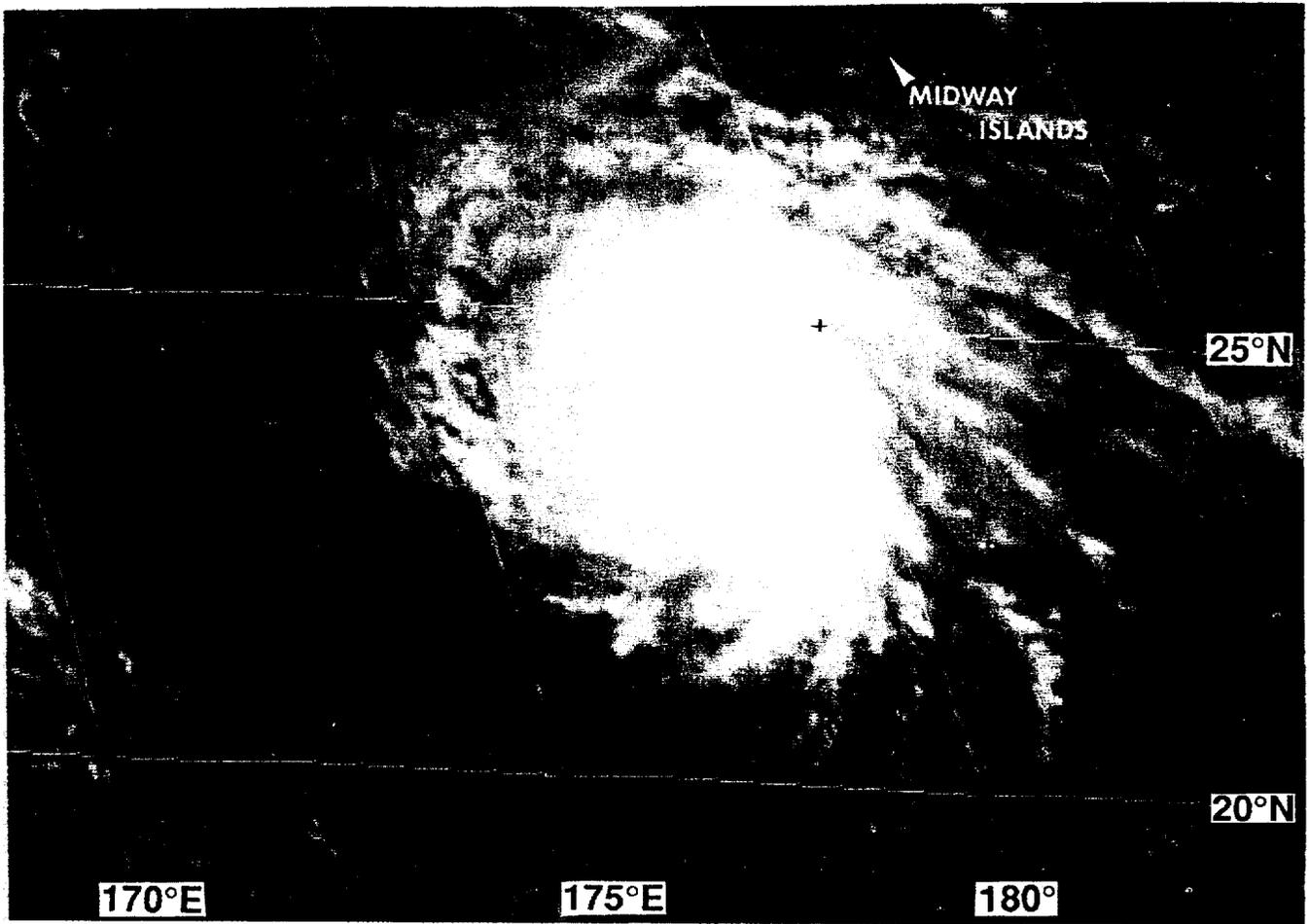


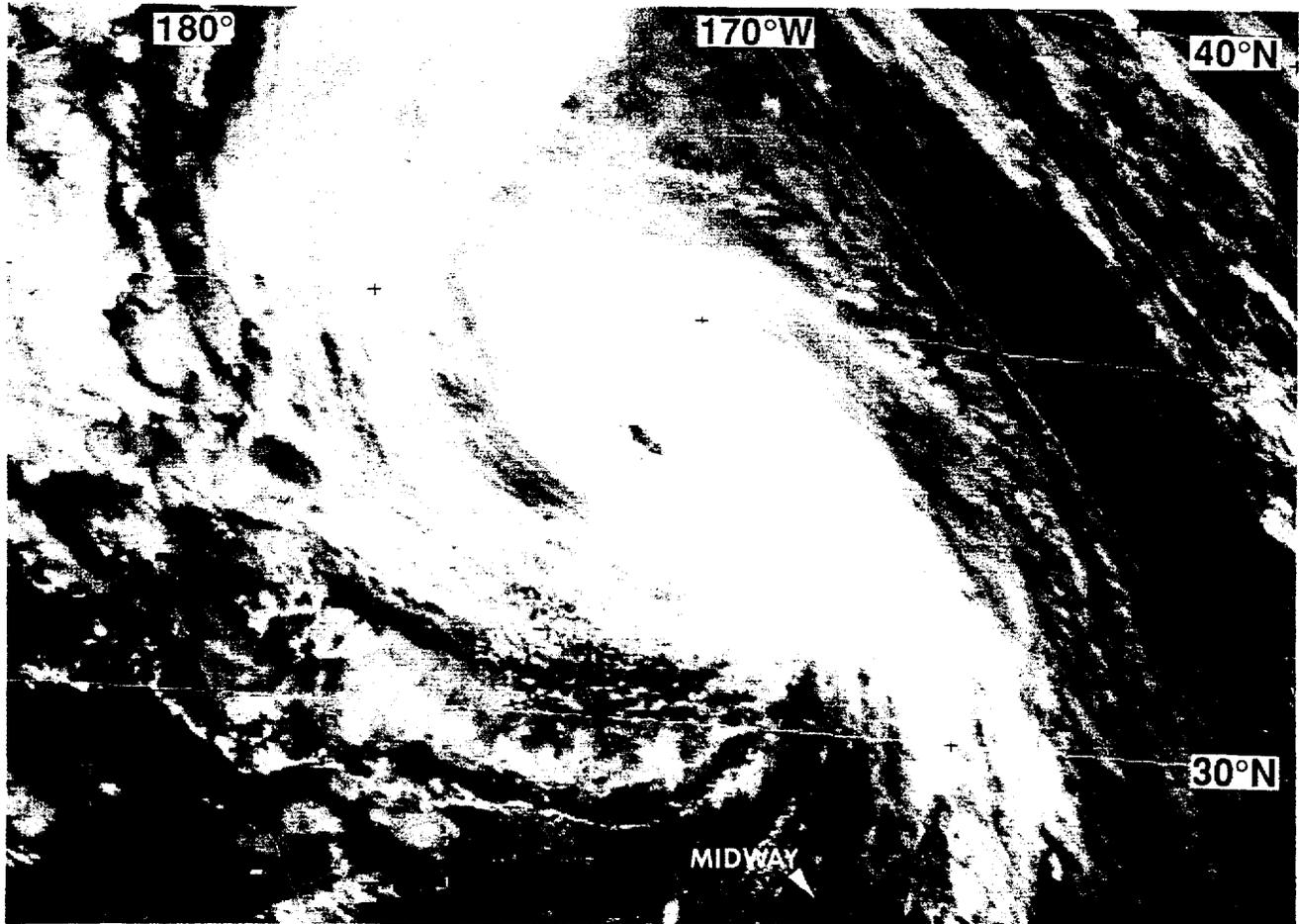
Figure 3-10E-1 A view of John shortly after it crossed the international date line (282331Z August visible GMS imagery).

### I. HIGHLIGHTS

John was the longest-lived tropical cyclone on record. Between the National Hurricane Center (Miami), the Central Pacific Hurricane Center (Honolulu) and the JTWC (Guam), a cumulative total of 120 warnings were issued on this system over the course of 31 days. While in the western North Pacific (JTWC's area of responsibility), John weakened from typhoon intensity to tropical storm intensity. Just before it re-crossed the international date line, it reintensified to a typhoon. As John began to reintensify, diagnosed intensities from satellite imagery were much lower than indicated by ship reports near the system center.

### II. TRACK AND INTENSITY

Beginning as a tropical depression off the southwest coast of Guatemala at 100600Z August, John traveled across the entire eastern North Pacific. It crossed the international date line and into the western North Pacific at 280900Z. When John was located 300 nm (555 km) south of the island of Hawaii at 230000Z, its intensity peaked at 150 kt (77 m/sec) — an unusually intense hurricane for that region. Moving steadily westward, it then weakened considerably (to 80 kt) and passed only 20 nm north of Johnston Atoll where some damage was reported (see Impact section). As it neared the international



**Figure 3-10E-2** Having moved back into the eastern North Pacific, John is once again at typhoon intensity (090031Z September visible GMS imagery).

date line from the east, John began to reintensify. It reached a secondary peak intensity of 105 kt (54 m/sec) at 281200Z as it entered the JTWC's area of responsibility (Figure 3-10E-1). The system weakened while meandering west of the international date line approximately 500 nm (925 km) west-southwest of Midway island. At 021800Z, real-time intensity estimates fell to 30 kt (15 m/sec) (these were later adjusted to 45 kt on the final best track), just prior to another period of intensification. A third and final peak intensity of 70 kt (36 m/sec) was attained at 081800Z after the system had recurved and moved back across the date line into the eastern North Pacific (Figure 3-10E-2 and Figure 3-10E-3). Rapid northeastward motion then ensued. The system became extratropical and gradually weakened, and the Central Pacific Hurricane Center, Honolulu, issued the final warning (warning number 120 — the most ever for a TC) at 100000Z September.

### III. DISCUSSION

#### a. Long life

The average life span of a tropical cyclone in the western North Pacific is approximately 6.5 days. Of the 420 tropical cyclones during the period 1980-1993, 156 (37%) lasted seven days or more and only 11 (2.6%) persisted for 14 days or longer. Of the tropical cyclones that have spent their entire lives in the western North Pacific, the two longest-lived tropical were Wayne (1986) (with an 18-day life span) and Nat (1991) (with a 17-day life span). Some tropical cyclones which formed in the eastern or cen-

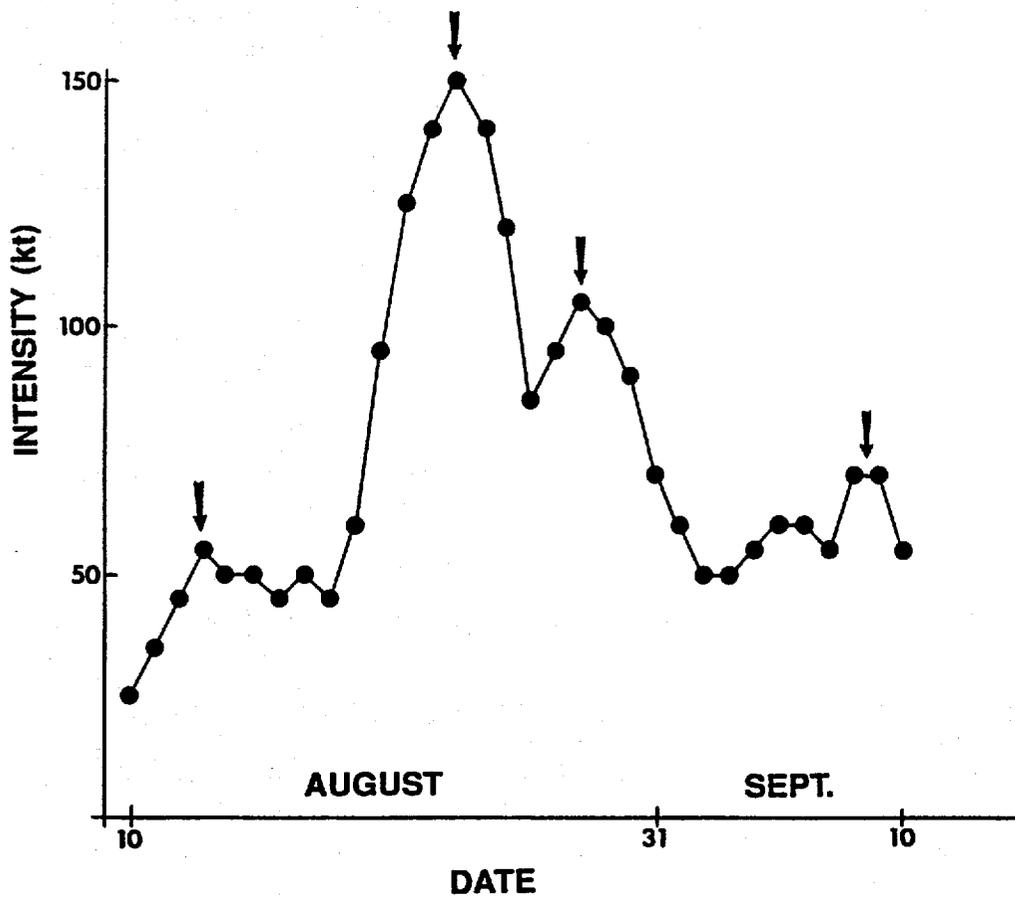


Figure 3-10E-3 A plot of John's intensity versus time. Each dot marks the highest intensity of each calendar day from August 10 to September 10.

tral Pacific and moved westward across the international date line into the western North Pacific have had longer life spans. For example, Enrique (1991), a tropical cyclone originating in the eastern North Pacific, lasted 20 days (including one day west of the date line). Keoni (1993), a tropical cyclone which originated in the central North Pacific, persisted for 24 days (including 9 days in the western North Pacific). John's total life span of 31 days (including 11 days in the western North Pacific) sets the record.

b. A problem with the intensity

After reaching a low-point of intensity at 021800Z September, John began to slowly reintensify. In real time, on or about 021800Z September, intensity estimates of John (based upon satellite imagery) fell below tropical storm intensity. Thus, John became a tropical depression on warning numbers 91 through 94 (the four warnings issued at six-hour intervals from 021800Z to 031200Z). On these warnings, the extended outlook beyond 48 hours called for dissipation as a significant tropical cyclone. However, on warning number 95 (031800Z September), John was upgraded to minimal tropical storm intensity with later weakening still indicated in the forecast. Twenty-four hours later, at 041800Z, the warning indicated that John was still at minimal tropical storm intensity, and the extended outlook continued to call for it to weaken. Two reports from a ship near John at this time, which were not received in real time at the JTWC, indicated that the intensity of John was under-estimated:

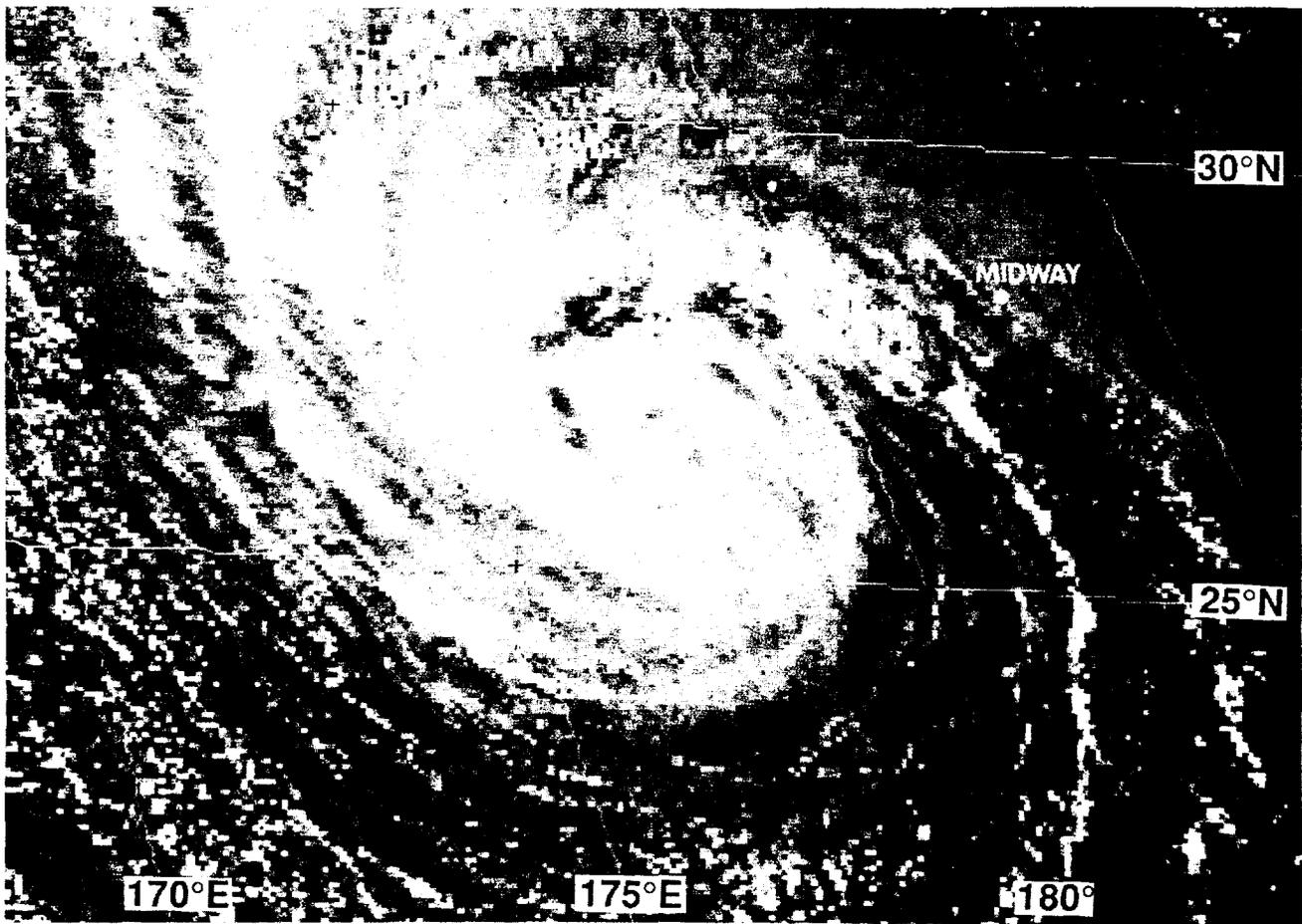


Figure 3-10E-4 John as seen in the low sun angle of evening. In real time, at the time of this picture, the warning intensity was 35 kt (18 m/sec). The final best-track intensity was upped to 60 kt (31 m/sec) based upon synoptic reports (050530Z September visible GMS imagery).

041500Z, 27.3°N 178.9°E, wind = 090 deg at 55 kt, SLP = 991.2 mb

041800Z, 27.6°N 177.7°E, wind = 050 deg at 55 kt, SLP = 993.5 mb.

Twelve hours after the valid time of these ship reports, the real-time intensity estimates were still probably too low. The 050530Z satellite imagery shown in Figure 3-10E-4 was diagnosed in real time to be of minimal tropical storm intensity. In post analysis, it was determined (based upon the aforementioned ship reports), that John was likely much more intense at this time — 60 kt vice 35 kt. With respect to the best-track intensity, each warning issued by the JTWC during the period 011200Z through JTWC's final warning at 081200Z, was anywhere from 5 to 25 kt too low.

#### IV. IMPACT

John spent all of its life over open water, and its greatest impact was felt when it skirted just north of Johnston Atoll. The Army's chemical weapons incinerator on Johnston Atoll had to be shut down, and all 1100 military and civilian personnel evacuated to Honolulu. The incinerator and ammunition storage areas weathered the storm well, but high winds caused minor to extensive damage to numerous support buildings and personnel billets. Electrical power and telephone communications were interrupted.